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LASER DIODE ARRAY AND TRANSMISSION OPTICS

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LASER DIODE ARRAY AND TRANSMISSION OPTICS

| | |
|-------------------------------------|------------------------------|
| LASER TYPE | AlGaAs Semiconductor Laser |
| WAVELENGTH | 830 nm |
| POWER PER LASER DIODE | 5 Watts |
| ELECTRICAL-TO-OPTICAL EFFICIENCY | 42 % |
| LASER SYSTEM | Parallel Array Amplification |

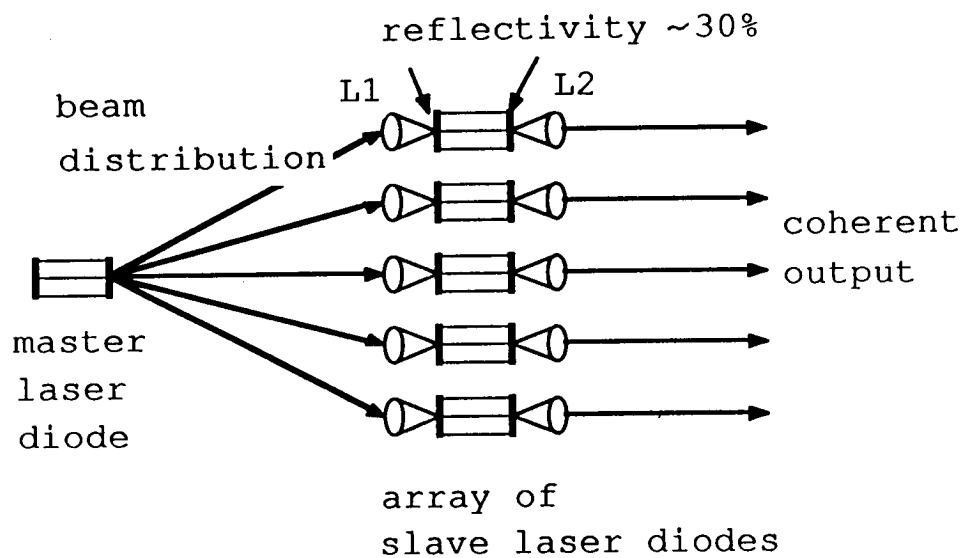
Coherent Combining of Laser Diode Arrays

1. Injection-Locking

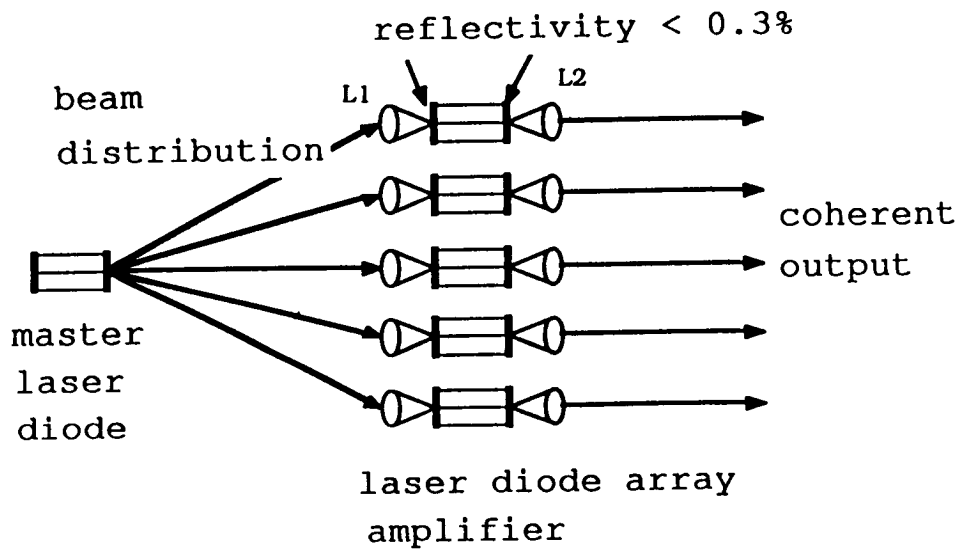
| | |
|--------------------------|-------------|
| locking bandwidth | 5 GHz(0.1Å) |
| temperature control | ±0.1 C |
| near threshold operation | |
| power gain | 17 dB |

2. Travelling-wave Amplification

| | |
|-------------------------|----------|
| amplification bandwidth | THz(20Å) |
| temperature control | ±5 C |
| power gain | 18.6 dB |

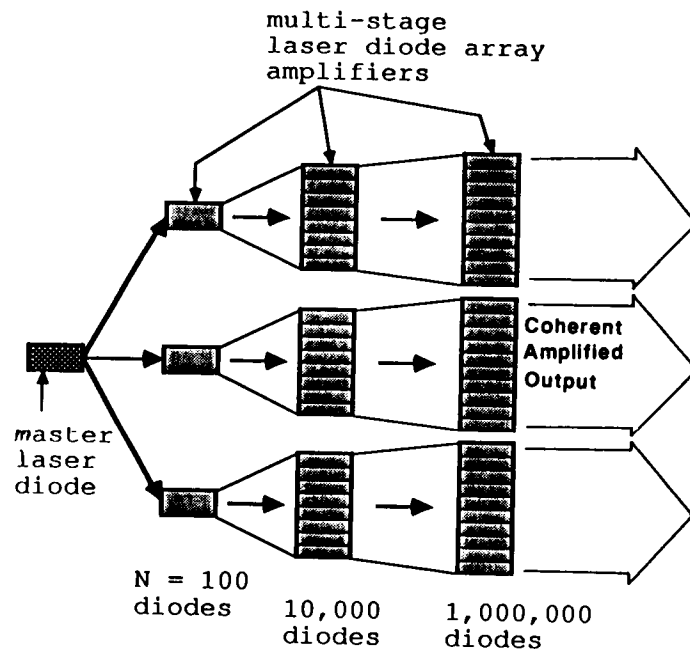


Injection-locking of laser diodes.

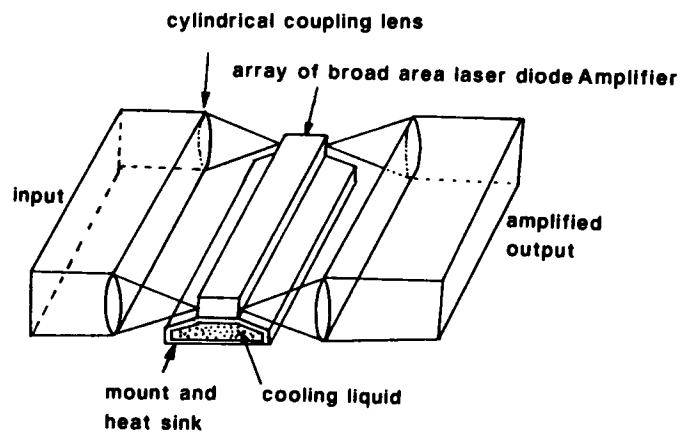


L1, L2 Input and Output Microlens Arrays

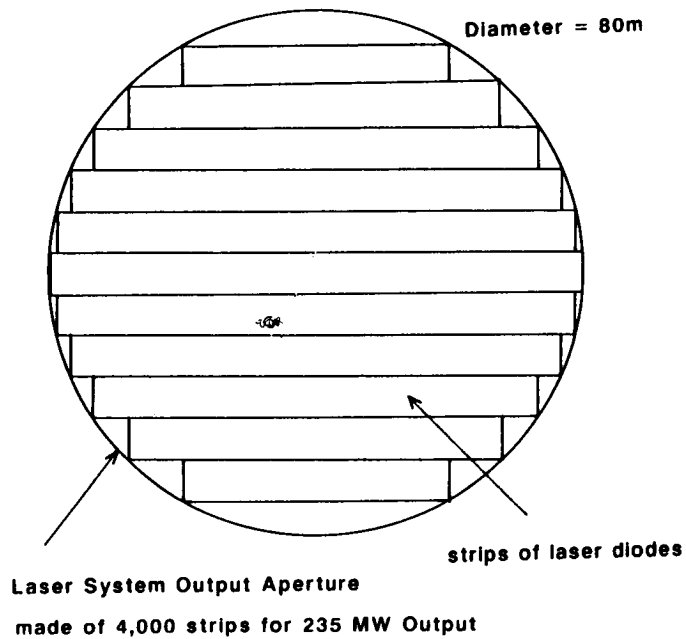
Amplification through laser diode array.



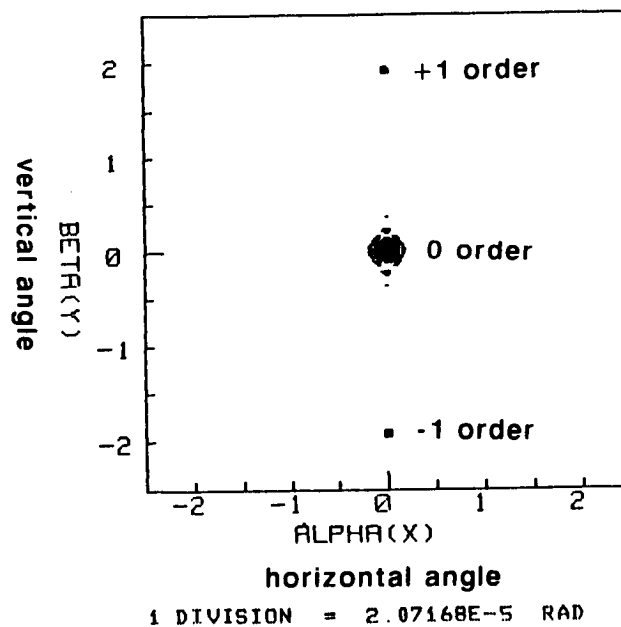
Multi-stage beam-combining and amplification.



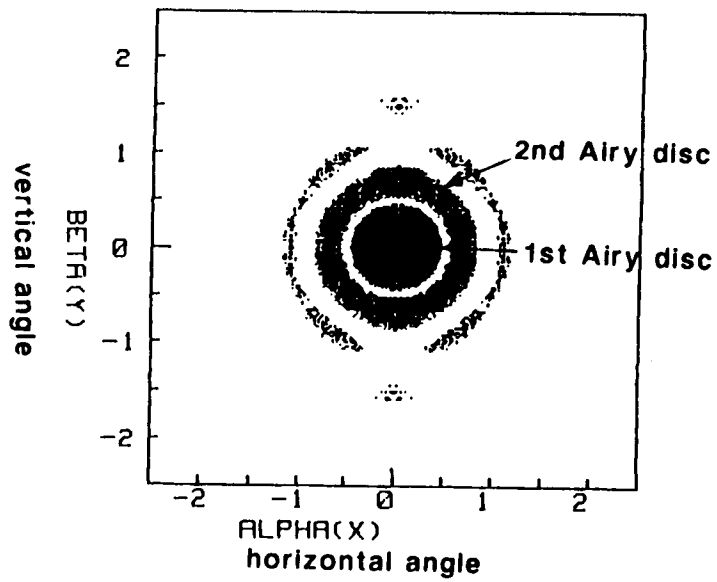
Basic Building Block of LD Array System
made with Broad Area Laser Diode Amplifier



Shape of Laser Diode Transmitter
at the Final Amplification Stage



Far Field Pattern of Laser Diode Array Transmitter

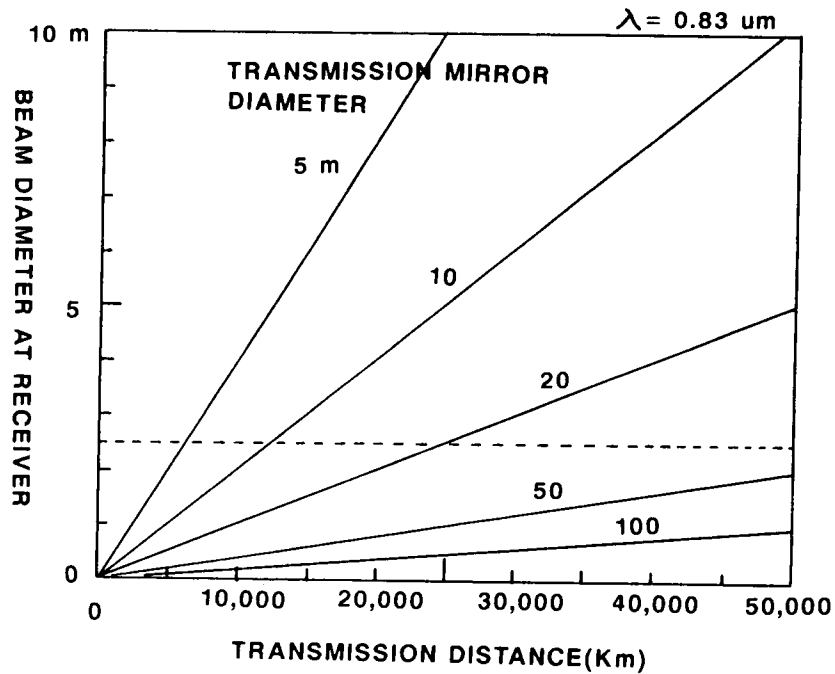


1 DIVISION = $1.90607058824 \times 10^{-6}$ RAD

Power inside 1st Airy disc = 84 %

Power inside 2nd Airy disc = 91 %

Detailed Structure of 0th order BeamPattern



Beam Diameter at Receiver vs. Transmission Distance.

CONCLUSION

**Laser System: Parallel Diode Array Amplifier
(500MW)**

**Power Collection Efficiency
at Receiver 85 %**

Transmitter Diameter 80 m

Receiver Diameter 3 m

Transmission Distance 50,000 Km